Journal of Pioneering Medical Sciences
Received: February 04, 2025 | Accepted: March 06, 2025 | Published: July 05, 2025
Volume 14, Issue 06, Pages 74-80

DOI https://doi.org/10.47310/jpms2025140611

Shaping the Future: University Students' Insights on Enhancing Preventive Eye Health Education for Parents and Teachers

Mujeeb Ur Rehman Parrey[1*], Abdulkrem Ahmed Alenazi[2], Mohammed Thummayl Alshammari[3], Sultan Abdullah Alrawili[4], Bandar Inad Alanazi[5] and Hanaa El-Sayed Bayomy[6]

[1]Department of Surgery, Faculty of Medicine, Northern Border University, Arar, Kingdom of Saudi Arabia
[2-5]College of Medicine, Northern Border University, Arar, Kingdom of Saudi Arabia
[6]Department of Family and Community Medicine, Faculty of Medicine, Northern Border University, Kingdom of Saudi Arabia

Author Designation: [1]Associate Professor, [2-5]Medical Student, [6]Associate Professor

*Corresponding author: Mujeeb Ur Rehman Parrey (e-mail: Mujeeb.Parrey@nbu.edu.sa).

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Abstract **Background:** Pediatric eye health is vital for overall development and early intervention can prevent long-term vision issues. University students, especially in health and education fields, offer key insights into improving awareness and prevention strategies. **Purpose:** This study assessed university students' views on the importance of preventive eye health education, related challenges and effective approaches for educating parents and teachers. **Methods:** A cross-sectional descriptive survey was conducted at Northern Border University, Saudi Arabia, from September 15, 2024, to January 15, 2025. Using random sampling, 482 students aged 18 and above were selected. Data was collected via online and in-person questionnaires and analyzed using STATA/SE 11.2. Results were expressed as frequencies, percentages and Mean±SD. The Shapiro-Wilk test assessed score distribution. Group comparisons used the Kruskal-Wallis and Mann-Whitney tests, with significance set at $p<0.05$. **Results:** Among 482 students, 62.86% were aged 18-22 and 68.46% were male. While 55.39% had formal eye health education, awareness levels varied: 29.25% were very aware, 34.23% somewhat aware and 11.62% unaware. Although 67% acknowledged the importance of educating parents and teachers, only 34.85% felt the topic was adequately covered in their curriculum. Older students and males showed significantly higher awareness ($p = 0.02$, $p = 0.002$). Main barriers included lack of awareness (59.13%) and limited resources (30.29%). Suggested improvements included curriculum integration (48.34%) and digital tools (43.57%). **Conclusion:** The study emphasizes the importance of preventive eye health education for parents and teachers. It also highlights gaps in current awareness and training. Addressing these issues through structured educational interventions can empower parents and teachers to promote pediatric eye health. Additionally, integrating preventive eye health strategies into the curriculum, utilizing digital education and fostering community engagement could enhance public awareness and help reduce childhood visual impairment.

Key Words Children, Curriculum Integration, Eye Diseases, Parent and Teacher Engagement, Prevention, Awareness, University Students, Visual Impairment

INTRODUCTION

Childhood visual impairment is an increasingly recognized public health concern worldwide, including in Saudi Arabia, where uncorrected refractive errors, amblyopia and other preventable eye conditions contribute to long-term visual disability. Early detection and timely intervention are crucial in mitigating these issues, highlighting the need for effective preventive strategies that focus on awareness, screening and proactive eye care measures. Given that children spend a significant portion of their time under the supervision of parents and teachers, these caregivers play a central role in identifying early signs of visual problems, ensuring timely medical consultations and reinforcing healthy visual habits. However, a lack of knowledge and awareness among parents and educators often leads to missed opportunities for early diagnosis and intervention. Empowering parents and teachers with accurate information on preventive eye health can significantly enhance their ability to safeguard children's vision.

University students, particularly those pursuing careers in health sciences, represent a valuable yet underutilized resource in strengthening community-based eye health

education. Their academic background, combined with their potential role as future healthcare professionals, positions them as effective advocates for disseminating crucial eye health information to parents and teachers.

By understanding university students' perspectives on how preventive eye health education can be enhanced, targeted interventions can be developed to bridge existing knowledge gaps and improve awareness at the community level. Incorporating their insights can lead to innovative, accessible and culturally appropriate educational strategies that promote early detection and prevention of childhood visual impairment. Ultimately, such efforts can contribute to reducing the burden of avoidable visual impairment and fostering a society that prioritizes children's eye health.

LITERATURE REVIEW

Eye health is crucial for a child's overall development and early detection of vision problems can prevent lifelong impairment and its long-term consequences [1-2]. Parents and teachers play a crucial role in preventing eye diseases in children and raising their awareness of early signs and preventive measures ensure timely intervention [3-4]. There has been a significant increase in the prevalence of pediatric eye diseases worldwide, driven by a combination of factors such as rising screen time, genetic predisposition, environmental influences and a lack of early detection and preventive measures [5-7].

Studies show that in Saudi Arabia up to 20% of school-aged children suffer from refractive errors, many of which go undiagnosed [8-10]. This highlights the need for targeted preventive eye health education for parents and teachers, who often first notice changes in a child's vision [11-14]. Culturally, family plays a central role in health decisions, with norms emphasizing the responsibility of the family for children's well-being. Therefore, involving parents in health education initiatives is essential. Understanding local cultural values is critical for developing effective strategies [15-16].

University students, especially those in health and education fields, are well-positioned to promote eye health education by bridging academic knowledge with community needs. Research highlights that culturally sensitive, community-driven programs are most effective in public health initiatives [17-18]. Understanding students' perspectives on preventive eye health education is essential for developing strategies that effectively engage parents and teachers. However, challenges such as the need for adequate training, institutional support and potential resistance from parents or educators must be addressed. Collaboration among students, educators and health professionals is crucial for establishing sustainable and impactful programs.

The current study aims to explore university students' perspectives on the importance, challenges and approaches to preventive eye health education for parents and teachers.

METHODS

Study Setting and Design

From September 15, 2024 to January 15, 2025, this cross-sectional descriptive survey was conducted among Northern Border University students in Arar city of Saudi Arabia.

Sample Size and Sampling Method

Convenient sampling technique was employed and the minimal sample size for the study (386) was calculated according to the equation:

$$\text{Sample size} = \frac{Z_{1-\alpha/2}{}^2 \, P(1-P)}{d^2}$$

where, "Z_{1}-∞/2 = is the standard normal variate at 5% type 1 error ($p<0.05$); it is 1.96, p = the expected proportion based on previous studies, d = the absolute error (0.05), the expected proportion was considered 50% since there is no previous study in the Northern, Border region and to maximize the sample size."

Research Tool

The level of awareness was assessed using a predesigned bilingual questionnaire (Arabic and English), which included an introduction section followed by a demographics section. Awareness of preventive eye health and perspectives on current education efforts were assessed through five questions in each section. The final section comprised four questions focusing on improvement suggestions. The questionnaire was distributed online via platforms such as Google Forms and university portals, as well as in-person at university campuses.

Inclusion and Exclusion Criteria

Both genders who are 18 years and above and are studying at a university were included. Individuals who live outside the study area and who are mentally challenged were excluded

Statistical Analysis

STATA/SE version 11.2 for Windows (STATA Corporation, College Station, Texas) was used for data management and analysis. The data were described in terms of frequency and percentage regarding categorical data and Mean±Standard Deviation (SD) regarding quantitative data. Shapiro-Wilk W test was used to examine the distribution of knowledge scores. Comparisons of students' knowledge levels between the different study groups were carried out using the Kruskal Wallis test (χ^2) and the Mann-Whitney Test (Z), as appropriate. Statistical significance was considered at $p<0.05$.

Ethical Approval

Ethical approval number 104/24/H for this project was issued by the Local Committee of Bioethics of Northern Border University.

RESULTS

A total of 482 university students participated, with the majority (62.86%) aged 18-22 years. Male students comprised 68.46% of the sample. Most students (59.96%) were from the College of Medicine and the largest group (24.27%) were in their fourth year (Table 1).

Over half (55.39%) had received formal education on eye health but only 41.49% had participated in related

Table 1: Demographic and Background Characteristics of the Studied Students (N = 482)

Variable		No.	%
Age (years)	18-22	303	62.86
	23-27	127	26.35
	28 or above	52	10.79
Gender	Male	330	68.46
	Female	152	31.54
College	College of Medicine	289	59.96
	College of Business Administration	22	4.56
	College of Home Economics	3	0.62
	College of Education and Arts	32	6.64
	College of Nursing	36	7.47
	College of Science	24	4.98
	College of Applied Medical Sciences	22	4.56
	Community College	14	2.90
	College of Engineering	18	3.73
	College of Sciences and Arts	4	0.83
	College of Pharmacy	12	2.49
	College of Computing and Information Technology	6	1.24
Academic Year	First Year	75	15.56
	Second Year	51	10.58
	Third Year	70	14.52
	Fourth Year	117	24.27
	Fifth Year	53	11.00
	Sixth Year	80	16.60
	Internship	36	7.47

Table 2: Students' Awareness of Preventive Eye Health Education for Parents and Teachers in Saudi Arabia (N = 482)

Variable		No.	%
Have you received any formal education or training on eye health?	Yes	267	55.39
	No	215	44.61
Have you ever participated in or organized any activities related to eye health education?	Yes	200	41.49
	No	282	58.51
How aware are you of common eye health issues in children (e.g., refractive errors, amblyopia)?	Very aware	141	29.25
	Somewhat aware	165	34.23
	Not very aware	120	24.90
	Not aware at all	56	11.62
Do you believe that preventive eye health education is important for parents and teachers?	Strongly agree	323	67.01
	Agree	101	20.95
	Neutral	44	9.13
	Disagree	6	1.24
	Strongly disagree	8	1.66
How strongly do you feel that preventive eye health education is currently covered by your university curriculum?	Strongly covered	168	34.85
	Moderately covered	162	33.61
	Slightly covered	91	18.88
	Not covered at all	61	12.66
Total score	Mean ±SD	3.16±1.47	

Table 3: Relationship Between Students' Awareness of Preventive Eye Health Education for Parents and Teachers in Saudi Arabia and Their Age and Gender (N = 482)

Variable		No.	Knowledge score (Mean±SD)	Test	P
Age (years)	18-22	303	3.10±1.47	X2 =7.76	0.02
	23-27	127	3.46±1.39		
	28 or above	52	2.85±1.53		
Gender	Male	330	3.31±1.45	Z=3.16	0.002
	Female	152	2.85±1.46		

χ^2: The Kruskal Wallis test statistic, z: The Mann-Whitney test statistic, Statistical significance was considered at $p<0.05$

activities. Awareness of common pediatric eye conditions varied, with 29.25% being very aware, while 11.62% had no awareness. Most students (67.01%) strongly supported preventive eye health education for parents and teachers, yet only 34.85% felt their curriculum adequately covered the topic (Table 2).

Awareness significantly differed by age (p = 0.02), with students aged 23-27 scoring highest (3.46±1.39). Gender differences were also significant (p = 0.002), with males scoring higher (3.31±1.45) than females (2.85±1.46) (Table 3, Figure 1 and 2).

About 32.37% considered current initiatives very effective, while 20.75% found them ineffective. Barriers included lack of awareness (59.13%), limited information access (42.95%), cultural factors (31.95%) and insufficient resources (30.29%). Key suggested topics for education

Table 4: Students' Perspectives on Current Educational Efforts to Enhance Preventive Eye Health Among Parents and Teachers in Saudi Arabia (N = 482)

Variable		No.	%
How effective do you believe the current eye health education initiatives for parents and teachers in Saudi Arabia are in preventing vision-related issues in children?	Very effective	156	32.37
	Somewhat effective	96	19.92
	Neutral	114	23.65
	Somewhat ineffective	64	13.28
	Very ineffective	36	7.47
	Unsure	16	3.32
What are the main barriers to effective preventive eye health education for parents and teachers in Saudi Arabia?*	Lack of awareness	285	59.13
	Limited access to information	207	42.95
	Cultural factors	154	31.95
	Insufficient educational resources	146	30.29
	Lack of trained professionals	158	32.78
What key topics should be included in preventive eye health education for parents and teachers?*	Common eye conditions and their prevention	294	60.99
	Early detection of vision problems	278	57.68
	Importance of regular eye exams	246	51.04
	Proper use of digital devices	200	41.49
	Healthy dietary habits for eye health	134	27.8
Do you believe that incorporating preventive eye health education into the existing school curricula could benefit students and teachers?	Strongly agree	212	43.98
	Agree	172	35.68
	Neutral	78	16.18
	Disagree	18	3.73
	Strongly disagree	2	0.41
How willing are you to participate in programs that aim to enhance your knowledge about preventive eye health?	Very willing	222	46.06
	Somewhat willing	184	38.17
	Not very willing	67	13.9
	Not willing at all	9	1.87

*More than one answer was allowed

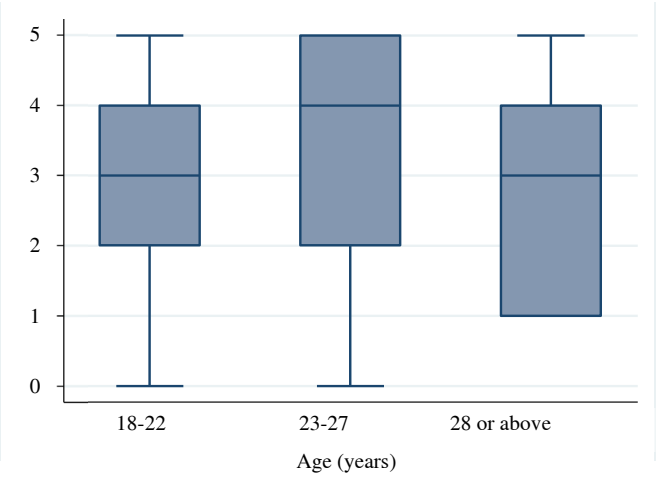

Figure 1: Comparison of Students' Awareness of Preventive Eye Health Education for Parents and Teachers in Saudi Arabia by Age (N = 482)

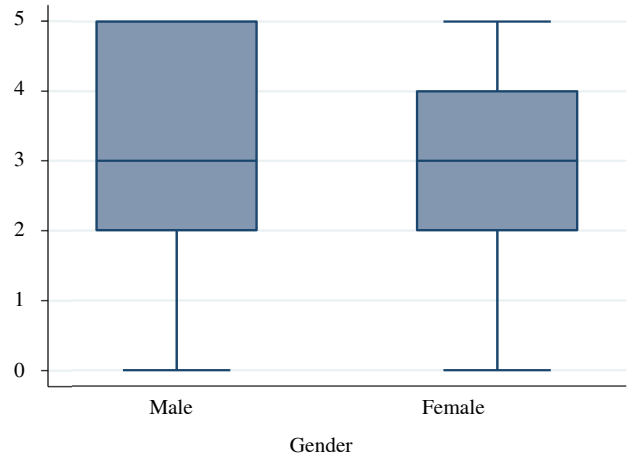

Figure 2: Comparison of Students' Awareness of Preventive Eye Health Education for Parents and Teachers in Saudi Arabia by Gender (N = 482)

included common eye conditions (60.99%), early detection (57.68%), regular exams (51.04%), digital device use (41.49%) and eye-healthy diets (27.80%). Most students (43.98%) strongly supported integrating eye health into school curricula and 46.06% were very willing to participate in educational programs (Table 4).

Proposed improvements included community programs (58.71%), school curriculum integration (48.34%), workshops (45.23%), digital platforms (41.91%) and volunteer initiatives (30.70%) (Table 5).

DISCUSSION

Demographic Characteristics of Participants

A total of 482 university students participated in this study, representing a diverse sample. The majority (62.86%) were aged between 18-22 years, with a predominance of male students (68.46%). This gender distribution may reflect the demographics of the university and participation trends in health-related research. Most students were from the College of Medicine (59.96%), with the largest group (24.27%) in their fourth year of study. Their higher representation could

Table 5: Students' Suggestions for Improving Preventive Eye Health Education for Parents and Teachers in Saudi Arabia (N = 482)

Variable		No.	%
In your opinion, what strategies could be adopted to enhance preventive eye health education for parents and teachers in Saudi Arabia?*	Developing community-based educational programs	283	58.71
	Integration of eye health topics into school curricula	233	48.34
	Collaboration with healthcare professionals for workshops and seminars	218	45.23
	Use of digital platforms and social media for awareness	202	41.91
	Encouraging volunteer opportunities in eye health	148	30.7
Do you believe technology (e.g., apps, virtual reality) could play a role in enhancing preventive eye health education?	Very significant	210	43.57
	Significant	164	34.02
	Neutral	84	17.43
	Slightly significant	13	2.7
	Not significant at all	11	2.28
What types of technology do you think would be particularly effective in promoting eye health education? *	Mobile health apps	253	52.49
	Online educational sessions	200	41.49
	Virtual reality simulations	154	31.95
	Interactive webinars	142	29.46
	Social media campaigns	201	41.7

*More than one answer was allowed

suggest increased engagement in academic initiatives and surveys at this stage of their education. Consistent with our findings, higher male participation in preventive health programs has been observed in Saudi Arabia [19]. In contrast, studies from Turkey [20] and Sweden [21] report greater female participation, highlighting geographical and educational differences that may influence engagement in health awareness programs.

Awareness of Preventive Eye Health Education

More than half of the participants (55.39%) reported receiving formal education or training in eye health. However, despite this exposure, only 41.49% had actively participated in related activities, suggesting a disconnect between theoretical knowledge and practical application. This gap underscores the need for more interactive engagement strategies to ensure students apply their knowledge in real-world settings.

Perception of Common Eye Health Issues in Children

The level of awareness regarding common childhood eye health issues varied among students. While 29.25% reported high awareness, 34.23% indicated moderate awareness. Encouragingly, a majority (67.01%) strongly agreed on the importance of preventive eye health education for parents and teachers. However, only 34.85% felt that their university curriculum adequately covered the topic, revealing a significant discrepancy between the perceived importance of eye health education and its academic representation. This suggests the need for curriculum enhancements that integrate preventive eye care more comprehensively.

Influence of Age and Gender on Awareness

The study found significant associations between students' awareness levels and their age and gender. Older students (aged 23-27 years) exhibited higher awareness levels, with a mean knowledge score of 3.46±1.39, compared to younger students (aged 18-22 years). This trend may reflect increased academic exposure to eye health topics over time. Additionally, male students had significantly higher knowledge scores than female students (3.31±1.45 vs. 2.85±1.46), warranting further exploration into gender-specific factors that influence awareness. Cultural, educational and social influences may contribute to these differences, emphasizing the need for targeted interventions to address potential disparities.

Effectiveness of Existing Eye Health Education Initiatives

Student opinions on the effectiveness of current eye health education initiatives for parents and teachers were mixed. While 32.37% found these initiatives very effective, 23.65% rated them as neutral or ineffective. This finding suggests that while some programs are beneficial, others may lack accessibility, engagement or relevance. Improving the structure and outreach of these initiatives is crucial to ensuring their effectiveness in raising awareness and fostering preventive eye health practices.

Barriers to Effective Preventive Eye Health Education

Several barriers to effective eye health education were identified, including lack of awareness (59.13%), limited access to information (42.95%) and cultural factors (31.95%). These findings highlight critical obstacles that hinder widespread implementation of educational programs. Addressing these challenges requires targeted interventions, such as improving accessibility to educational resources, tackling cultural stigmas and promoting community-wide understanding of eye health.

Strategies to Enhance Preventive Eye Health Education

Students proposed various strategies to improve preventive eye health education. The most favored approaches included integrating eye health topics into school curricula (43.98%) and developing community-based educational programs

(58.71%). These findings reinforce the importance of embedding eye health education within broader public health initiatives.

Additionally, students showed strong interest in utilizing technology for eye health education. A significant proportion (43.57%) viewed digital tools as essential, with mobile health applications (52.49%) and online educational sessions (41.49%) being the preferred platforms. These insights suggest that leveraging digital resources could enhance the accessibility and reach of eye health education programs, particularly among parents and teachers.

CONCLUSIONS

This study highlights a significant gap in preventive eye health education among university students, particularly in terms of formal training, participation in related activities and integration into the academic curriculum. While most students recognize the importance of eye health education for parents and teachers, there is a clear need for more comprehensive coverage of eye health topics in university curricula. Furthermore, the findings suggest that increasing awareness, overcoming barriers such as limited access to information and leveraging technology could enhance the effectiveness of preventive eye health education. Addressing these issues will be crucial in promoting better eye health practices and ensuring that students are well-equipped to educate others, particularly in school and community settings. The study also calls for future research to explore the impact of current educational initiatives and to develop strategies for more targeted and effective eye health programs.

Strengths

The study provides valuable insights into university students' awareness of preventive eye health education, highlighting key areas for curriculum development and community engagement. The inclusion of demographic factors such as age and gender enables a nuanced understanding of how these variables influence awareness and perceptions of eye health.

Limitations

The cross-sectional design limits the ability to draw causal conclusions and the reliance on self-reported data may introduce response bias, affecting the accuracy of the findings.

Acknowledgement

The authors extend their appreciation to the Deanship of Scientific Research at Northern Border University, Arar, Saudi Arabia for funding this research work through the project number "NBU- FFR-2025-1301-03".

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